Overview of Hydrogen Strategy and Activities

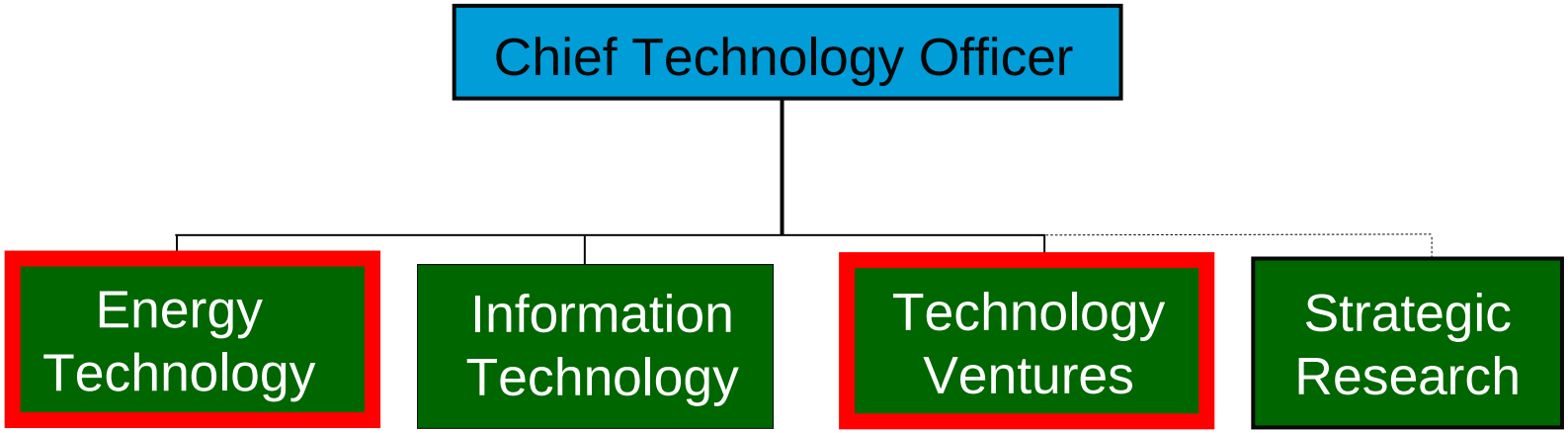
Hydrogen Reporter Briefing

August 30, 2005

Chevron Global Energy Company

- Business in approximately 180 countries
- More than 47,000 employees
- 125 year history

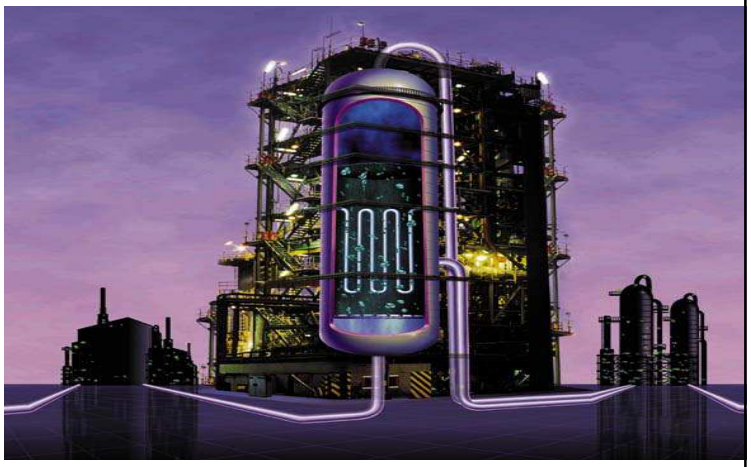
Corporate Technology Structure



- Three wholly-owned subsidiaries
- Total workforce ~ 3000
- Technology centers in
  - *Texas: Houston*
  - *California: San Ramon, Richmond, Bakersfield*
- More than 100 global support sites

From Refining to Molecular Design

- Improving current fuel performance:
  - Driving toward very low sulfur levels
  - Converting heavier crude slates
- Creating options for super-clean synthetic fuels:
  - Opening access to new global gas resources
  - Blending stock to raise the diesel pool quality
  - Using unconventional feedstocks

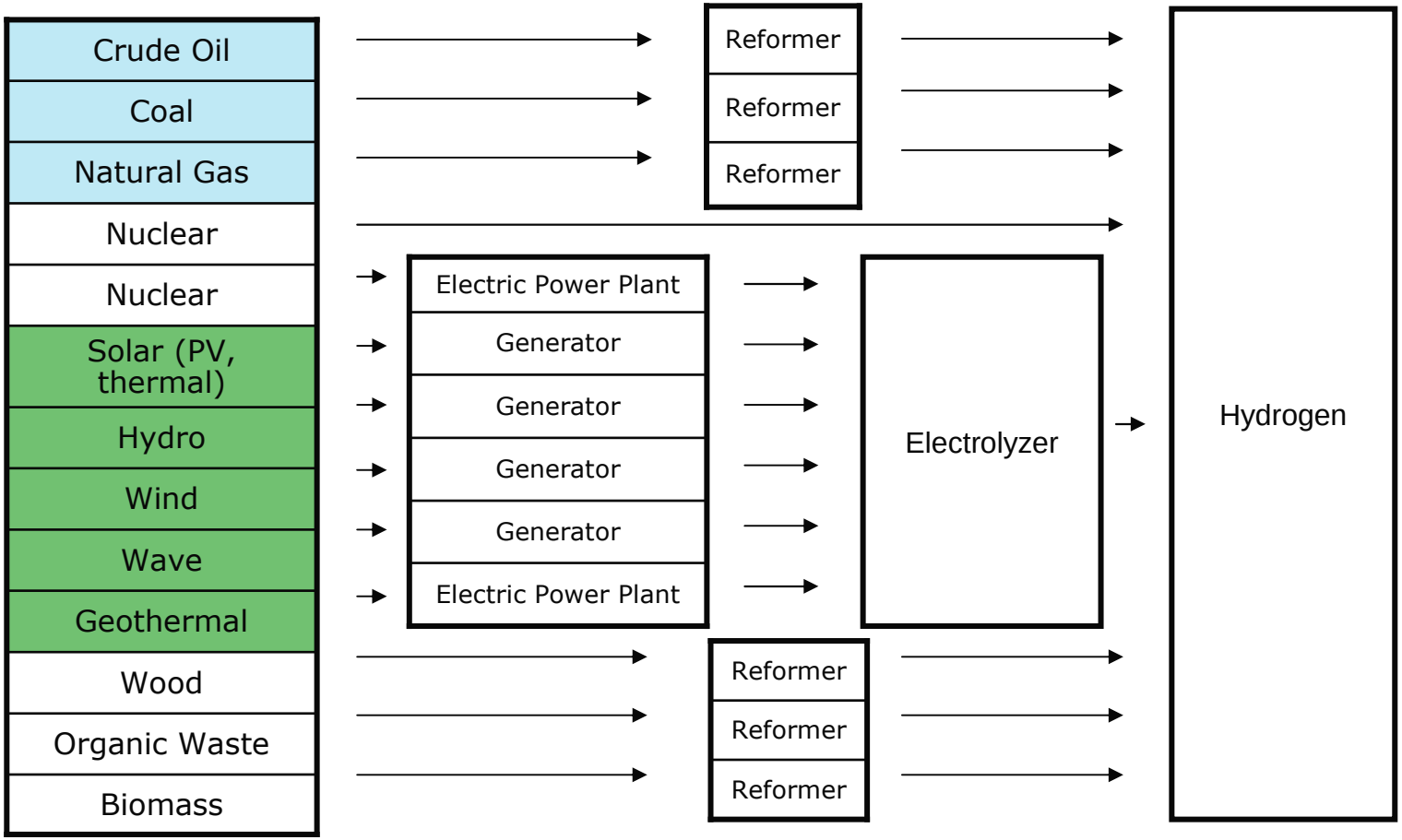


CTV Hydrogen Strategy

- Develop organizational capability to be a market leader should hydrogen be adopted in the fuels portfolio
- Leverage hydrogen as an extension of our existing businesses
- Ensure CVX is positioned to actively participate in the development of hydrogen technologies and related regulations and legislation
- Enhance CVX's reputation as a leader in fuel processing

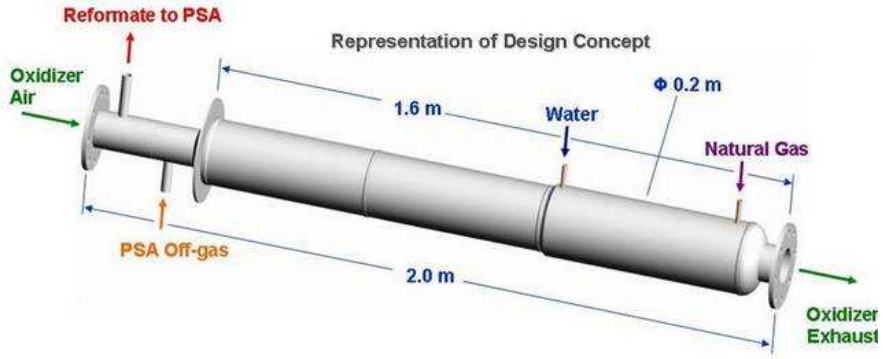
Hydrogen Fuel Pathways

Multiple ways to make H2 - natural gas reformation is one of the least expensive.



Current Hydrogen Technology Applications

- Autothermal Reformer for low volume requirements
- Advanced Steam Methane Reformer development
- Single Step Absorption Enhanced Reforming (in partnership with U.S. DOE)
- System level controls and integration of infrastructure refueling applications



Hydrogen Infrastructure Demonstrations

- **Public-private partnerships**
  - Multi-year cost-sharing programs with Federal and State Agencies, industry partners
- **Objective**
  - To demonstrate safe, practical hydrogen technologies in real-world settings
  - Identify and overcome key technical challenges
- **Distributed Chevron Hydrogen energy stations**
  - Designed to fuel demonstration fuel cell vehicles and stationary power applications
  - Currently located with strategic partners in California, Florida, Michigan and New Mexico
- **Limited access**
  - Not available for public use
  - Early-stage applied R&D, reflective of the state of technology

U.S. DOE Hydrogen Fleet & Infrastructure Demonstration & Validation Project

- 5 year project to showcase practical application of H2 technology
- Develop and demonstrate safe, convenient, reliable H2-based distributed power generation, FCVs and vehicle fueling infrastructure
- Educate key audiences about H2 as potential fuel for transportation and power generation
- Sites and fleet operators: HATCHI, SoCal Edison, AC Transit and U.S. DOD
- Fueling for up to 32 H2 FCVs
- Integrated Codes & Standards, Education & Outreach Plans

Chevron Hydrogen Energy Stations

Challenges to the Hydrogen Transition

- Need for substantial public education on H2 safety.
- Limited number of H2 vehicles translates into very low utilization that will be slow to increase, further increasing costs and the retail price of H2.
- H2 fuel cells are expensive and need improved reliability, durability, and performance.
- On-board storage capacity must be increased.
- H2 is relatively expensive to produce, much more so than gasoline. Significant breakthroughs are needed to lower costs.
- Efficiency and emissions performance of viable near-term methods of H2 production must be further improved.
- H2 refueling stations are new and not fully tested. Hence, learning curves are still steep, costs high, experience limited.
- Strategies for H2 delivery systems must be decided. New technical approaches and a fundamental shift in manufacturing technologies are required.

Current Storage Technologies are Inadequate for the Future

For example, this 105 kg of hydrogen at 6,000 psi occupies 1,078 cubic feet and has roughly the same energy density as 8 cubic feet of gasoline. New technologies will be required to meet the fueling requirements of large numbers of hydrogen-powered vehicles.

Ongoing Chevron Steps

- As a major energy company, we are:
  - Providing analysis and experience on the full range of transportation fuel options to address environmental issues
  - Sharing our experience in addressing issues involving H2 and its infrastructure, and other alternative fuels
  - Participating in demonstration projects and developing new energy sources
- Chevron is committed to:
  - Investing in promising innovative energy technologies
  - Supporting flexible and economically sound policies that protect the environment
  - Increasing energy efficiency and reducing Greenhouse Gas Emissions